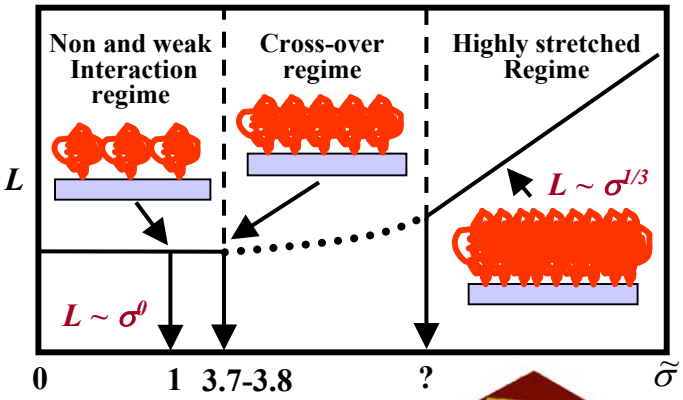
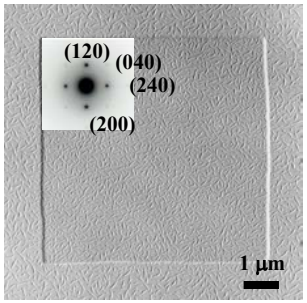
Onset of Tethered Chain Overcrowding

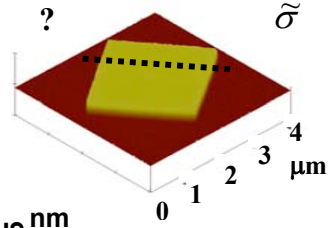
Stephen Z. D. Cheng , *The University of Akron* (DMR-0203994)

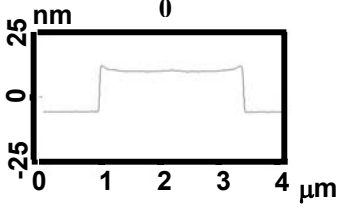
Tethered polymer chains on substrates have been recognized to be an important topic in enabling a wide range of surface applications associated with bio- and nano-technologies. However, a fundamental understanding of these systems has been restricted by experimental difficulties. Our group proposed a new method to use lamellar single crystals of two series of diblock copolymers, poly(ethylene oxide)-*block*-polystyrene (PEO-*b*-PS) and poly(L-lactic acid)-*block*-polystyrene (PLLA-*b*-PS), grown in different dilute solutions as templates to generate tethered polystyrene chains on the crystalline substrates. By monitoring the thickness changes of the single crystal as a probe, the onset of tethered chain overcrowding has been found to be a sharp transition, which happens universally at a reduced tethering density value of 3.7-3.8 for these systems.

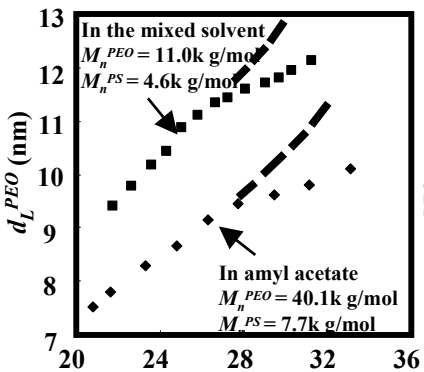
Physical Review Letters, **2004**, *93(2),* 028301.

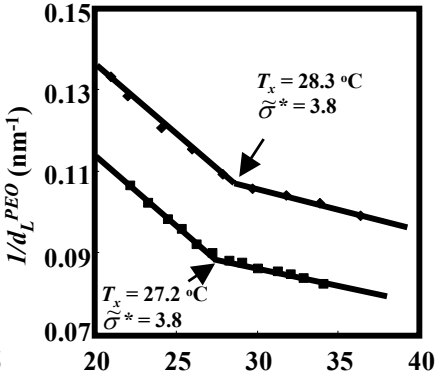












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Education:

Two graduates have achieved their PhDs under the grant in 2004: Dr. Ping Huang (post-doc at the University of Akron) and Dr. William Y. Chen (Investa). Two personnel, Mr. Joseph X. Zheng (a 4th year Ph.D. graduate student) and Dr. Ping Huang (a post-doctoral associate) are working on the research topics under this grant. A new Ph.D. graduate student, Mr. Ryan M. Van Horn, has joined our research group to work on these topics as well.

Outreach:

Many high school students have toured our lab to learn about what polymers are, and how useful these materials are in our delay lives as well as in high technologies. Each summer, undergraduate students join our group as summer interns. Mr. Ryan M. Van Horn, who came from Lafayette College, was in my research group as a summer intern in 2003 under the supplemental support of this grant. He has decided to join my group as a Ph.D. graduate student to continue the research work he started last year.